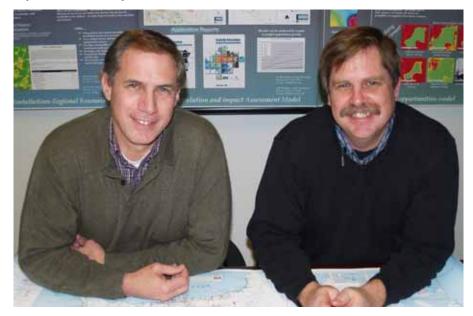# ERDC Project to Develop Land-Use Assessment Tools Wins DoD Award

By Dana Finney

Jim Westervelt (left) and Brian Deal led the team that developed mLEAM.

A novel approach to analyzing encroachment issues at installations earned two researchers the Project of the Year Award from the Strategic Environmental Research and Development Program (SERDP). Dr. James Westervelt, CERL, and Dr. Brian Deal, University of Illinois at Urbana-Champaign (UIUC), were honored during the recent SERDP Partners in Environmental Technology Symposium at Washington, D.C.

The award, in the Sustainable Infrastructure category, recognizes efforts to develop dynamic spatial decision support systems that help installations and their surrounding communities plan compatible land uses. One tool, called Sustainable Installations Regional Resource Assessment (SIRRA), can screen for potential encroachment problems at the national or regional level. If the results suggest that urban growth may create future problems, planners may propose a more in-depth analysis using the Land use Evolution and impact Assessment Model (LEAM).

"A Senior Readiness Oversight Committee report identified encroachment as a huge DoD problem in 2002," said Westervelt, a project manager with CERL's Ecological Processes branch. "To address this finding, ERDC created the Sustainability, Encroachment, and Room to Maneuver [SERM] program to develop tools to

model conditions both inside and outside the fenceline."

DoD considers "encroachment" to be any external stressor that holds potential to compromise the training and testing missions at an installation. Urban growth is a primary contributor. Increasing populations and developments destroy surrounding habitat vital to many threatened and endangered species. Residences built within earshot of an installation's activities, such as live-fire training and flyovers, lead to public and political pressure to stop or curtail the mission. More people mean competing demands for water, airspace, infrastructure, and bandwidth. And there are multiple other impacts.

According to John Brent, chief, Environmental Management Division at Fort Benning, Ga., "Light from the community has become a critical issue because it interferes with night training. Another big challenge with population growth is dispersion – the more people we have in areas where we make noise and generate dust, the more likely that will lead to negative attitudes, which can escalate and begin to affect our mission."

Deal, who previously worked at CERL, conceived of LEAM as his Ph.D. dissertation topic and originally received funding from the National Science Foundation (NSF), which then led to a

Noise from live-fire training and aircraft flyovers can annoy local residents, placing pressure on the post to limit or end activities.

The ability for planners and stakeholders to "see" this type of outcome is critical to LEAM's success. The program runs scenarios based on those factors identified as concerns or risks by the community.

According to Brent, "LEAM is a very powerful visualization tool. If you just give the public a lot of numbers, it's meaningless. But when you run a LEAM scenario and they can see things blinking on and off, it really brings relevance to what you're trying to show them."

mLEAM supports two levels of analysis. The "quick and dirty" run, which takes about two days, uses existing data such as national satellite imagery, cover, digital elevations, Federal and state lands data, and so on. The more intensive mLEAM analysis can take months, and in fact is not intended to be a one-shot affair. The model's dynamic, real-time assessment features allow planners to revisit a region again and again, and to adapt 30-year plans as land uses change over time.

In addition to helping fund LEAM's development, SERDP provided partial funding for SIRRA, which was designed to work in tandem with mLEAM and other models within the Fort Future toolbox. SIRRA assesses a region's sustainability based on ten factors: air, sir space demand, energy, urban development, threatened and endangered species, locational issues, water, economic issues, quality of life, and transportation. Its database contains regional data organized into national data sets that relate to 54 sustainability indicators.

"In the current climate of joint, distributed, regional military training, it's important to be able to evaluate sustainability issues on a regional basis," said CERL's Elisabeth Jenicek, who led SIRRA's development. "SIRRA provides data and vulnerability ratings not just for regions containing military installations but for the entire United States."

Jenicek's team has completed SIRRA assessments for 308 military installation regions nationwide, identifying highly vulnerable regions that require more detailed studies. Both SIRRA and mLEAM were used to support the 2005 Base Realignment and Closure (BRAC) analyses.

successful proposal to SERDP. "The approach was to merge social system modeling with the geographical and biological systems modeling that Jim [Westervelt] and others had been doing at CERL," said Deal, now a professor of urban and regional planning at UIUC.

"The bottom line was to connect proposed regional plans with long-term training and testing opportunities for the installation," Westervelt added. "A model can't *predict* anything, but by using multiple data sets and other things we know about different indicators in a region, we can run scenarios to inform decision-makers about the potential consequences of their planning."

As an example, suppose an installation's local community proposes to build a new road and would like to establish the most strategic location for economic development, while not interfering with the Army's activities. mLEAM (the version adapted for military analysis) can model and graphically present outcomes, such as subdivisions springing up along the road, and relate that to noise contours, dust dispersion, lights, and other training or testing activities.

"With a tool like mLEAM in the 1950s, it would have been possible to see that siting Interstate 25 just three to five miles farther east of Fort Carson would avoid some major encroachment problems in the future," Westervelt said.

Because of its potential impact on future training and testing missions, encroachment figured prominently in this round of BRAC. SIRRA also supported the 320/366 Range Report to Congress and was applied to a sustainability analysis of watersheds.

Paradoxically, the economic benefits that installations bring to a region fuel population growth that in turn can cripple the military's ability to operate that post for its intended use. Tools like LEAM and SIRRA can help communities avoid encroachment problems by enabling all kinds of "what-if" analyses and arming decision-makers with the best available information.

"A model can't give you the answers, although many people would like for that to be true," said Deal. "In the end, the plan is a political decision. But we can model and add value to the process so that people understand the implications of those decisions."

Brent added," It brings in the sense of long-term needs and allows the community to see the bigger picture. It can show them that if you only focus on short-term needs, you may be going down a path that will ultimately shut Fort Benning down."

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